CHEVRON RICHMOND REFINERY
TENTATIVE ORDER AND NPDES PERMIT

REQUEST FOR *COMPLIANCE SCHEDULE* AND DEMONSTRATION OF INFEASIBILITY TO ACHIEVE IMMEDIATE COMPLIANCE WITH CALCULATED EFFLUENT LIMITATION FOR

Dioxin

Executive Summary

Note: Chevron continues to maintain that the RWQCB and staff have not made a valid showing that Chevron has a reasonable potential and deserves a limit for most of the dioxin congeners. Chevron does not waive its objections to the inclusion of effluent limits for dioxin in its NPDES permit. Chevron submits this addendum for any and all dioxin and dioxin congener limits which may ultimately be properly adopted by this board.

Pursuant to discussions with staff and to §2.1 of the SWRCB's *Policy for Implementation of Toxics Standard for Inland Surface Waters, Enclosed Bays, and Estuaries of California* [the "SIP"], Chevron submits as an addendum to its NPDES permit application a request for a compliance schedule and Chevron's documentation that it is infeasible to meet the final limits for dioxin proposed in the RWQCB's tentative order.

<u>Infeasibility Demonstration</u>.

In support of its request, Chevron submits the following demonstration that it is infeasible to achieve immediate compliance with the 0.014 pg/L (as TEQ) AMEL and 0.028 pg/L (as TEQ) MDEL for Dioxin

As defined in the SIP, infeasible means

> “not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors”

In this case, the SIP defines a “reasonable period of time” to be “immediate.” Therefore, in cases where, as here, the actions needed to achieve compliance could not be implemented by the permit’s effective date, they could not be completed within a reasonable period of time. In addition to this timing factor, possible actions to achieve compliance must be evaluated in light of the defined factors to determine their feasibility.

Staff has calculated a proposed final Water Quality Based effluent limits of 0.014 pg/L (as TEQ) average monthly effluent level (AMEL) and 0.028 pg/L (as TEQ) maximum daily effluent level (MDEL). Chevron's performance history relating to this constituent reflects that Chevron's effluent does not meet this limit. Further, as explained in greater detail below, Chevron has undertaken a variety of efforts to date to reduce its discharge loading as much as possible and cannot achieve immediate compliance with the proposed final limits for the following reasons:

- Source of the contaminant is generally known, as described elsewhere in this document, but we need to develop additional information on the quantity and variability of the principle source(s) before we can develop additional appropriate measures for control

- The technology currently in place is already thought to be the best available and we are not aware of a better technology to provide

- If any major projects were to be generated as the result of identifying additional practical treatment or source control technologies, we would have to go through a permitting process and might trigger CEQA and an environmental impact analysis

- A detailed program to develop alternative feasibility technologies may need to be considered

Given the efforts to date, it is unclear what additional actions and measures may be necessary to meet that limit. A number of steps will be needed to determine what actions may be necessary and feasible in order to achieve compliance with this limit. Those steps will involve additional studies to evaluate future options, and those studies may demonstrate that new technology or new methods are necessary, appropriate and feasible. For example, Chevron may evaluate options, using criteria such as the following:

- Known, demonstrated technology that is available and has been demonstrated in refineries or related industries;
- Ability to achieve required effluent levels;
- Ability to pilot or demonstrate the technology in Chevron's plant;
- Implementation time for a given technology;
- Feasibility and cost effectiveness.

Certainly, carrying out these steps will be costly and time-consuming and may require additional environmental analyses and permits. In any case, they can not be completed and implemented in time for this permit to go into effect.

For the reasons discussed above, Chevron believes it is infeasibility to achieve immediate compliance with the proposed effluent limit for DIOXIN

Dioxin is a CWA §303(d)-listed constituent and subject to the TMDL development process and subsequent Waste load Allocation (WLA). Chevron has not detected the most toxic dioxin form of 2,3,7,8-TCDD congener in its effluent, nor has Chevron detected any of the other congeners in its effluent in the past five years save for one instance on the benign octa congener.

Because dioxin is a §303(d)-listed constituent as determined unilaterally by EPA IX, ultimately a final limit for dioxin will be based on a TMDL and a waste load allocation (WLA) for the refinery (or, the receiving waters will be delisted for dioxin). Notwithstanding that the TMDL has not been completed, Staff has proposed a WQBEL for dioxin (all 17 congeners) in the tentative order of 0.014 pg/L (as TEQ) average monthly effluent level (AMEL) and 0.028 pg/L (as TEQ) maximum daily effluent level (MDEL). Chevron cannot comply with these limits immediately..

In the following sections Chevron will document:

A. Diligent efforts made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts;

B. Source control and/or pollution minimization efforts currently underway or completed;

C. A proposed schedule for additional or future source control measures, pollution minimization actions, or waste treatment;

D. A demonstration that the proposed schedule is as short as practicable.

A. Pollutant Levels and Sources.

Final Limits. The proposed WQBEL final limits for dioxin are:
AMEL: 0.014 pg TEQ/L
MDEL: 0.028 pg TEQ/L

Effluent data:
Dioxin is monitored annually in refinery effluent. In the past five years, Chevron has detected only one congener, the octa congener, and that only once. However, based on TEQ, this value was 0.033 pg/L TEQ. This is over both limits.

Without a database of historical quantifiable performance, it is difficult to know how often we may violate the proposed limits, but even for the one congener detected, the data demonstrate that the final limits cannot currently be met.

Sources:

Dioxin is known to form during the regeneration of catalyst in catalytic reformers. If formed, it is a byproduct of petroleum refining and not a compound intentionally formed or manufactured.

Catalytic reformers are units which convert low octane naphtha feedstocks to high octane blendstocks, or reformates, which Chevron blends into the gasoline pool to make California Cleaner Burning Gasoline. Use of reformate has allowed the refinery to cease use of tetra-ethyl lead in the gasoline pool while still providing the motor fuels required by California law.

Reforming of the naphtha occurs over a precious metal catalyst at high temperature and moderate pressure, in a reducing atmosphere. It is believed that dioxins are not present in naphtha feedstocks and are not formed during actual reforming (since the atmosphere is reducing, but dioxins are products of partial oxidation).

In the process of reforming naphthas to higher octane reformates, hydrocarbons give up some of their hydrogen and a certain amount of coke is formed on the catalyst. Ultimately the catalyst must be regenerated to restore its activity.

In the Chevron Richmond Refinery, the catalytic reformers are of a type that requires the unit to be shut down to regenerate the catalyst. A unit is taken off-line and the coke is carefully burned off the catalyst by introducing an atmosphere containing only about 2% oxygen and a chlorine containing compound. Oxygen is limited to limit the rate of coke burn and hence the temperature in the reactor. The chlorine restores properties of the catalyst (such as crystal structure) which are necessary to optimize the unit's performance.

As coke is burned off the catalyst, combustion products exit the reactor as a gas stream. The chlorine compound produces hydrochloric acid as a byproduct, and this is present in the exiting gas as well. The exiting gas is cooled in a heat-exchanger train. Downstream metallurgy must be protected from attack by acidic gases, using an aqueous solution of some alkaline compound (caustic, sodium bicarbonate, or an amine) injected into the gas stream.

The mode of dioxin formation is thought to be as follows: dioxin precursors are present in the gases exiting the reactor and, if conditions are conducive dioxins may be formed on soot particles in the gas stream. These soot particles are then scrubbed out of the gas when the aqueous solution is injected, and the soot particles with low levels of dioxins may be present in this aqueous solution.

The aqueous solutions are ultimately routed to the refinery effluent system for treatment. They constitute a small fraction of the total facility effluent flow.

B. <u>Current Pollution Minimization Efforts:</u> Chevron is constantly striving for improved catalysts with longer run times, as every time a catalytic reformer is shut down and taken off-line for regeneration, there are significant costs both in the regeneration work and in the lost opportunity to produce gasoline. Chevron optimizes its catalytic reformer operations to minimize regeneration and the associated production of wastes.

In addition, the current best known technology for dioxin removal is thought by some to be use of granular activated carbon (GAC). Chevron believes that the GAC may merely be acting as a filter. Notwithstanding the mode of GAC in minimizing dioxins, Chevron is treating its final effluent through GAC.

C. Pollution Minimization Proposal and Schedule

The Discharger agrees to participate in the development of a TMDL for Dioxin. The Discharger will give a written annual update to the RWQCB staff to document the discharger's participation toward progress in development of the TMDL.

Chevron will conduct any additional source control or pollution minimization studies and implement their results in accordance with California Water Code §13263.3 and §2.1 of the SIP relating to Pollution Prevention Plans. Section 13263.3 establishes a separate process outside of the NPDES permit process for the preparation, review and approval and implementation of such plans.

D. Why schedule is as short as practical.

The Discharger and the RWQCB staff both recognize that the development of TMDLs will likely take longer than the permit term. The schedule for adoption of the TMDL determines the length of the compliance schedule and, on that basis, is as short as possible. The Discharger agrees to work with the staff to again evaluate the length of the compliance schedule during consideration of the Discharger's next NPDES permit.

DIOXIN Infeasibility Evaluation Data, May 2001 — Table 1.0
Chevron Richmond Refinery
6 Year Evaluation Period: 1995 - 2000

1613A, Dioxins/Furans
Unit: pg/L — Results do not reflect TEF (TEQ Calculation) nor available 10:1 dilution.

Parameter	1995		1996		1997		1998		1999		2000	
	Result	D. L*.	Result	D. L.	Result	D. L.	Result	D. L.	Result	D. L.	Result	D. L.
2,3,7,8-TCDD	ND	1.2	ND	1.1	ND	1.8	ND	7.4	ND	0.97	ND	1.5
1,2,3,7,8-PeCDD	ND	0.94	ND	2.4	ND	5	ND	9.4	ND	1.9	ND	3.2
1,2,3,4,7,8-HxCDD	ND	1.6	ND	3.5	ND	3.5	ND	8.7	ND	0.65	ND	3.7
1,2,3,6,7,8-HxCDD	ND	1.6	ND	3.7	ND	3.3	ND	9.2	ND	0.69	ND	4.1
1,2,3,7,8,9-HxCDD	ND	1.7	ND	3.8	ND	3.2	ND	9.4	ND	1.4	ND	3.6
Total HxCDD	ND	3	ND	3.8	ND	3.5	ND	9.4	ND	2.7	ND	4.1
1,2,3,4,6,7,8-HpCDD	ND	1.8	ND	7.2	ND	5.2	ND	8.6	ND	12	ND	3.8
Total HpCDD	ND	1.8	ND	7.2	ND	5.2	ND	8.6	ND	12	ND	3.8
OCDD (3)	ND	11	ND	32	**33**	--J (1)	ND	28	ND	30	ND	24
2,3,7,8-TCDF	ND	1.6	ND	1.2	ND	4.2 g (2)	ND	5.5	ND	1	ND	1.9
1,2,3,7,8-PeCDF	ND	2.7	ND	1.9	ND	1.3	ND	10	ND	1.4	ND	1.7
2,3,4,7,8-PeCDF	ND	2.2	ND	2.4	ND	1.1	ND	12	ND	1.5	ND	1.7
Total PeCDF	ND	2.7	ND	4.4	ND	1.3	ND	12	ND	1.5	ND	1.9
1,2,3,4,7,8-HxCDF	ND	0.86	ND	3.1	ND	4.3	ND	3.2	ND	2.5	ND	2.5
1,2,3,6,7,8-HxCDF	ND	1.3	ND	2.7	ND	4.5	ND	3.4	ND	2.3	ND	1.4
2,3,4,6,7,8-HxCDF	ND	1.4	ND	5.9	ND	3.2	ND	3.4	ND	6.8	ND	1.7
1,2,3,7,8,9-HxCDF	ND	1.9	ND	3.6	ND	3.4	ND	3.3	ND	1.6	ND	1.5
Total HxCDF	ND	1.9	ND	5.9	ND	4.5	ND	3.4	ND	6.8	ND	2.5
1,2,3,4,6,7,8-HpCDF	ND	3.3	ND	3.6	ND	1.7	ND	3.7	ND	24	ND	4.1
1,2,3,4,7,8,9-HpCDF	ND	4.7	ND	4.5	ND	1.3	ND	5.9	ND	8.4	ND	1.3
Total HpCDF	ND	4.7	ND	4.5	ND	1.7	ND	5.9	ND	24	ND	4.1
OCDF	ND	2	ND	13	ND	4.6	ND	9.2	ND	34	ND	4.6

D.L. = Detection Limit

Data Qualifiers:
j: Result is an estimated (highly questionable) value that is below the lower calibration limit but above the target limit.
g: 2,3,7,8-TCDF results have been confirmed on a DB-225 column.